



Infrastructure, buildings, environment, communications

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ENVIRONMENTAL

Subject:

Fourth Quarter 2006 Groundwater Monitoring Report and SVE System Update
Former Chase Chemical Site
13540 and 13546 Desmond Street
Pacoima, California

Date:
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Dear Dr. Farkas:

Contact:
Greg Fiol

ARCADIS is pleased to submit this progress report on behalf of Soco West, Inc. to present the results of the fourth quarter 2006 (October through December) groundwater monitoring and interim remedial action (IRA) activities performed at the Former Chase Chemical Site (Site) (Figures 1 and 2). The IRA activities at the Site consist of operation and maintenance (O&M) of a soil vapor extraction (SVE and bio-sparg [air sparge]) system. Groundwater monitoring was performed in accordance with the Field Sampling Plan (FSP) included as Appendix B of the approved Remedial Investigation/Feasibility Study (RI/FS) Work Plan¹, and according to the monitoring schedule presented as part of the fourth quarter 2005 monitoring report.

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ARCADIS performed groundwater monitoring on November 29 through December 1, 2006. This event included gauging and or sampling of groundwater monitoring wells MW-1 through MW-16, PF-1A, PF-2A, OW-1, and OW-2. Groundwater gauging and sampling forms are included as Appendix A. Well locations are illustrated on Figures 1 through 3. In addition to the wells monitored by ARCADIS at the Site, wells at the former Price Pfister site, located south of the Former Chase Chemical site (Figure 2), were also concurrently monitored by Erler & Kalinowski, Inc. (EKI), for groundwater elevations and volatile organic compound (VOC) impacts. The monitoring at the former Price Pfister site by EKI was performed on behalf of Black and Decker, Inc.

¹ Geomatrix, 2000, *Remedial Investigation/Feasibility Study Work Plan*, Former Chase Chemical Site, June 26.

screen submerged were purged at the screen mid-point. Figure 5 indicates the elevation of the pump relative to the elevations for each well.

Prior to sampling, groundwater was purged until pH, temperature, specific conductance, dissolved oxygen (DO) and oxidation-reduction potential (ORP) stabilized to approximately 10 percent of three consecutive readings. Water quality measurements were collected using a Horiba U-22 flow-through cell. Groundwater purge logs are included as Appendix A.

Once the parameters had stabilized, groundwater samples were collected through the pump discharge tubing (dedicated tubing for each well) into laboratory-supplied containers with appropriate preservatives according to the requirements of the sample analysis. All samples were labeled by date and consecutive sample number for that day (for example 12906-1 represents Sample no. 1 collected November 29, 2006). A sample key is included in Appendix C.

Groundwater samples were placed in coolers with ice and submitted to Calscience Environmental Laboratories, Inc. (CEL), a California certified environmental laboratory in Garden Grove, California, for VOC analysis by EPA method 8260B.

Duplicate sample were collected from wells MW-3 and MW-15. Two trip blanks and three equipment blanks were also collected during the monitoring event. These samples were analyzed to evaluate the effectiveness of decontamination and the precision of laboratory analytical procedures. The duplicate sample was collected in a different set of sample containers immediately following the collection of the primary sample. The duplicate sample was analyzed for the same laboratory parameters as the primary sample. The collection of field quality control samples was performed in accordance with the FSP.

Chain-of-custody forms were completed to document the sample transfer. Copies of chain-of-custody forms are included in Appendix C along with laboratory analytical report.

1.3 Purged Groundwater Disposal

Purged groundwater and decontamination water from the groundwater sampling event were stored on site in 55-gallon Department of Transportation (DOT) approved steel drums and will be transported for offsite disposal within 90 days of the fourth quarter 2006 sampling event. Disposal documentation for the third quarter 2006 groundwater sampling event is presented in Appendix F.

1.4 Groundwater Results

A summary of the groundwater analytical results for the fourth quarter 2006 is presented below. Laboratory analytical results are summarized in Table 2 and

selected results are shown on Figures 6 and 7. Historical analytical results are included as Appendix D.

1.4.1 General Groundwater Quality

Select groundwater quality data for the current reporting period are discussed below:

- The ORP data ranged from 97 (MW-1) to 180 mV (MW-10) and DO data ranged from 0.29 (MW-1) to 12.14 milligrams per liter (mg/L) (MW-6). The generally higher ORP and DO are the result of air-sparging activities at the Site.
- Methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK) and acetone, which historically have been detected above reporting limits, were not detected in any of the wells sampled this quarter.
- Benzene was detected in one well PF-2A at 1.0 µg/L. Toluene, ethylbenzene, and total xylenes were detected in one well, MW-1, at concentrations of 41, 1.5, and 5.8 µg/L, respectively.
- PCE was detected in all 15 wells sampled but concentrations ranging from 2.2 (OW-2) to 110 µg/L (PF-2A). The detected PCE concentrations were similar to those detected during the third quarter 2006 sampling event.
- TCE was detected in 13 of 14 wells sampled at concentrations ranging from 1.1 (OW-1) to 120 (MW-1) µg/L. These concentrations were similar to the prior sampling event with the exception of MW-1 where the TCE concentration increased from 97 to 120 µg/L since the previous event.
- *Cis*-1,2-DCE concentrations decreased from 81 to 19 µg/L, 460 to 150 µg/L, and 2,300 to 2,000 µg/L in wells MW-6, MW-16 and PF-2A, respectively, since the third quarter 2006. This compound increased from 530 to 660 µg/L in well MW-1 during the same interval. *Cis*-1,2-DCE was detected in 7 other wells during the current sampling event at concentrations ranging from 1.3 (MW-3, MW-11) to 7.7 (MW-10) µg/L and were in all cases lower than the previous event.
- Other chlorinated VOCs (cVOCs) including chloroform, 1,2-dichlorobenzene, 1,1,1-trichloroethane (1,1,1-TCA), *trans*-1,2-dichloroethene, 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene, and 1,1-dichloroethane were detected in wells MW-1 and PF-2A at concentrations considerably lower than PCE and TCE and similar to the previous sampling event. Trace concentrations, less than 10 µg/l, of one or two of these dichlorinated ethenes and/or 1,1,1-TCA were also detected in Site wells MW-3, MW-10, and MW-13 similar to the third quarter 2006 event. Vinyl chloride was not detected in any of the wells during this sampling event.

- No analyses for semi-volatile organic compounds (SVOCs – including 1,4-dioxane) were conducted during the current sampling event.

1.4.2 Quality Control Analytical Results

The precision of laboratory analytical procedures for the groundwater monitoring results was evaluated based on the results of duplicate sample analyses. When compared with those of the primary sample, analytical results of the duplicate sample are within appropriate control.

2 Evaluation of Historical Groundwater Trends

The purpose of this section is to examine historical groundwater analytical data from areas of interest on-Site and downgradient of the Site in order to denote major trends in dissolved phase compounds. Secondly, from observable trends, factors are identified which may be causing or influencing these trends. The April 2004 Remedial Investigation identified the most significant source of solvent impact to soil as related to the 20 former underground storage tanks (USTs) and associated dispenser area and piping removed from the southern corner of the Site in 1998. VOCs have historically been detected upgradient of the former USTs at relatively low concentrations. However, to facilitate this discussion the “source area” on the Site is considered the location of the former USTs and associated solvent dispenser area and piping and surrounding soils impacted by releases from these structures. Based on more than 15 years of hydraulic head data, groundwater has consistently been identified as flowing to the south-southeast. Therefore the terms upgradient and downgradient refer to wells or locations generally north-northwest and south-southeast of the source area, respectively.

2.1 Total and Chlorinated Volatile Organic Compounds (TVOCs and cVOCs) in Groundwater

Figures 8, 9, and 10 present TVOC concentrations and groundwater elevation data from upgradient wells MW-2, MW-3, and MW-7; source area wells MW-1, MW-5, MW-6; and downgradient wells PF-2A, MW-15, and MW-16 collected since 1995, respectively. Figures 11, 12, and 13 present selected cVOC concentration data for the same well set over the same time interval. Wells MW-2, MW-3, and MW-7 form a line trending southeast from the upgradient - northeast corner of the property to the northern side of the source area. MW-7 is located approximately 90 feet northwest of soil vapor extraction wells VEW-1 and VEW-2. MW-1, MW-5, and MW-6 are representative of VOCs in groundwater within the source area. Wells MW-15 and PF-2A represent occurrence of constituents in groundwater downgradient of the Site and on the upgradient side of the former Price Pfister facility. MW-16 is located further downgradient and is seen as representative of the downgradient portion of constituents migrating off-Site. The concentration data points shown in Figures 8 through 10 are a summation of detected and laboratory estimated TVOC results from EPA Method 8260 or corresponding earlier EPA

analyses. Non-detect values were treated as the detection limit where known and as zero where the detection limit is not known to simplify the evaluation. Therefore these data points are seen as representative but estimated.

2.1.1 Upgradient Wells

As shown in Figures 8 and 11, total and chlorinated VOCs have gradually declined to less than 100 µg/L since 2000 in upgradient wells. In MW-2 and MW-7, in particular, all VOCs have declined essentially to non-detect levels. The recent rebound of TVOC concentration in well MW-3 is comprised largely of an increase in PCE, TCE and *cis*-1,2-DCE (Figure 11). This may have resulted from the resaturation of soils between 985 and 990 feet above mean sea level (famsl), however, cVOCs in MW-3 appear to have quickly dissipated by the most recent sampling event. A similar increase in cVOCs is further discussed for the source area.

2.1.2 Source Area Wells

Total and chlorinated VOC concentrations have dropped 3 to 6 orders of magnitude in the source area since inception of the SVE system operations in January 2003 as shown in Figures 9 and 12. Most of this reduction resulted from the removal of non-chlorinated aliphatic constituents, namely acetone and MEK, approaching ten million parts per billion to less than ten parts per billion as in MW-5. Overall, these graphs also show no direct correlation between increasing or decreasing groundwater level and increasing or decreasing TVOC concentrations in the source area. There appears to be a strong correlation between falling TVOCs in groundwater and the introduction of soil vapor extraction from January 2003 continuing until the present. Similar decreases in individual parent chlorinated VOCs (cVOCs - including PCE, TCE, and 1,1,1-TCA) are also evident in wells MW-1, MW-5, and MW-6 as shown in Figure 12. Recently, during the first two sampling events of 2006, relatively minor increases in cVOC concentrations occurred in these wells which may correspond with resaturation of soils between 985 and 990 famsl and possibly a brief period of reductive dechlorination in the vicinity of MW-1. Falling CVOC concentrations in MW-6 during the most recent sampling event (November 2006), however, suggest this increasing trend may already be dissipating.

2.1.3 Downgradient Wells

As shown in Figure 10, TVOC concentrations in wells MW-15 and MW-16 are gradually declining but at a slower rate than in the source area and do not appear to relate directly to groundwater level or inception of SVE in the source area. Individual cVOCs are gradually decreasing in these wells to below 10 µg/L (with the exception of *cis*-1,2-DCE in MW16 which is between 10 and 100 µg/L).

Well PF-2A does not show a consistent upward or downward trend when considering TVOCs (Figure 10). This well is screened across the water table from 50 to 70 fbg similar to nearby wells MW-10 and MW-13 and has consistently yielded similar or

slightly higher concentrations of cVOCs than either of these wells when sampled. Of the downgradient wells on the northern side of the Price Pfister site, PF-2A is generally considered to be representative of the highest off-site concentrations of cVOCs in the downgradient portion of the dissolved phase plume migrating away from the Site. As shown in Figure 13, individual CVOC concentrations are slowly decreasing in this well.

2.2 Natural Attenuation of CVOCs

In the source area, the wells with highest remaining concentrations are generally MW-1, MW-5, and MW-6. In all of these wells, the most concentrated VOC is *cis*-1,2-DCE, the first unique daughter product of PCE and TCE reductive dechlorination. As was observed in the Final Remedial Action Plan (December 6, 2005), natural attenuation (NA) of PCE, 1,1,1-TCA, and TCE has already been observed. Support for this view includes decreases in cVOC concentrations, observation of the final degradation products (ethene and ethane), and past evidence of strongly reducing conditions which are necessary for cVOC degradation. The presumed carbon donor for this reaction has been the LNAPL and dissolved mineral spirits plume in the source area.

Concentrations of *cis*-1,2-DCE in MW-5 and MW-6 have decreased significantly since July 2005 and July 2004. In both cases, these decreases in concentration correlate with the reduction of 1,1,1-TCA below detection limits (i.e. less than 20 µg/L). While the conversion of PCE and TCE to *cis*-1,2-DCE can be mediated by many organisms, the conversion of *cis*-1,2-DCE to vinyl chloride and subsequently to ethene and ethane is generally thought to be mediated by strains of *Dehalococcoides*. 1,1,1-TCA is known to inhibit *Dehalococcoides*. This suggests that late-stage dechlorination was hampered by the presence of 1,1,1-TCA and now that 1,1,1-TCA concentrations have decreased below the inhibitory threshold, cVOCs (especially *cis*-1,2-DCE) are undergoing reductive dechlorination. Air sparging is generally somewhat inhibitory to this process since reduction of chlorinated solvents requires strongly reducing, anaerobic conditions and air sparging can introduce oxygen into the system.

In the downgradient plume characterized by PF-2A and MW-16, there is also evidence of reductive dechlorination. In both wells, the primary cVOC is *cis*-1,2-DCE. In addition, in PF-2A there have been detections of vinyl chloride and ethene. Concentrations in MW-16 have been decreasing at the same rate as in PF-2A (see Figure 14) which supports a stable or shrinking dissolved VOC plume. There is no evidence of a significant electron donor present in this area to create optimal conditions for reductive bioattenuation. In addition, the large scale declines in cVOCs observed in the source area may not as yet have been manifested in these downgradient wells.